DISPATCH

CLASSIFICATION: SECRET

PROCESSING ACTION
- MARKED FOR INDEXING
- NO INDEXING REQUIRED
- ONLY QUALIFIED DESK CAN JUDGE INDEXING
- MICROFILM

TO: Chie[redacted] 25X1A

INFO. 25X1A

FROM: Chief, [redacted] JMB

SUBJECT: Engineering Air Conditioning System a[redacted] Site

ACTION REQUIRED - REFERENCES 25X1A

25X1A

1. During their recent visit [redacted], OL/R&CD, suggested that one of their consultant firms could analyze the air conditioning systems at [redacted] Site and provide recommendations for a balanced, more efficient system. 25X1A

2. We are forwarding system details compiled by the [redacted] Staff as unclassified attachments so they may be given directly to the contractor. A prompt reply, especially with respect to improvements which could be accomplished prior to our hot season, would be appreciated.

[redacted]

25X1A

[redacted]

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[redacted]

Attachment:
1. Drawing of ducting and room sizes
2. Table of room sizes, volume, electrical loads, and persons normally occupying rooms
3. Description of three systems and comments on operation
4. Factors to be considered in making study

25X1A

Distribution:
Original & 2 - Chief, [redacted] w/atts.

25X1A

RE LO Job No. 202-69

RECORDED OL REGISTRY

CROSS REFERENCE TO	DISPATCH SYMBOL AND NUMBER	DATE
GROUP 1 Excluded from automatic downgrading and declassification	[redacted]	30 December 1968
	CLASSIFICATION: SECRET	HQS FILE NUMBER

Contract refrigeration mechanic perform the following on all the installed air conditioning systems:

a. Using a halide torch or similar leak-detection device, check all refrigerant piping on all three systems for refrigerant leaks. Repair all leaks.

b. Recheck all three systems to determine that each system has a full charge of refrigerant and oil. Fill all deficient systems with the proper refrigerant and oil to the proper level.

c. Replace all refrigerant dryers and refrigerant straining elements.

d. Check all thermal expansion valves, solenoid valves, capillary tubing, and similar external devices to ensure that all such devices are operating properly. Replace all defective devices.

e. Check each compressor to ensure that it is operating on all cylinders, that no valves are stuck, and unloading devices (if any) are actually loading and loading in response to suction pressure.

CELL A-1
Tutor

f. Vacuum-clean the surfaces of each evaporator coil and each air-cooled condenser coil.

g. With a tachometer or similar speed-measuring device, check the speed of each evaporator fan and air-cooled condenser fan. If speed is too low, check fan belt for slippage and tighten the belt if necessary. Do not increase fan speed to such a extent that fan motor draws current in excess of rating listed on the motor nameplate. Check actual current drawn by the motor by means of a clamp-on ammeter to ensure against excessive current draw.

h. Clean the filters on all units and replace those too dirty to be cleaned.

i. Check all electrical terminals for tightness.

j. Lubricate all fan motors.

k. Check action of thermostats to ensure that air conditioning compressors respond properly.

l. Clean condensate drain pan of each unit.

2. For the water-cooled system do the following;

a. Acid-clean the condenser tubes.

b. Clean the cooling tower basin.

c. Repair any leaks in the tower basin and condenser water piping.

d. Winterize the tower by adding an electric immersion heater in the tower basin, wrapping the exposed condenser water and fill piping with electric heating cable, and then insulating this piping.

e. If the condenser water piping contains no water regulating valve, install an automatic diverting valve in the condenser water piping to regulate condenser water temperature entering the condenser.

3. For all ductwork:

   a. Seal all leaks in the existing ductwork with fiberglass duct tape and polymer solution sealer.

   b. Provide an outside air connection and dampers for each system if such connection does not now exist.

   c. Using a velometer or other air velocity measuring device, balance the air flow from each air outlet by positioning the damper at each outlet. If no dampers exist at the outlets, add a damper behind each grille.

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FEASIBILITY STUDY

AIR CONDITIONING OF [redacted] RECEIVER BUILDING

25X1A

EXISTING CONDITIONS

The [redacted] Receiver Building is a masonry windowless structure of approximately 5700 square feet in floor area and structure containing approximately 17 rooms. Each room contains some electrically-operated lights and equipment, the electrical input thereto varying from 200 watts in one of the smaller rooms to 31,700 watts in one of the larger rooms.

There are three separate existing air conditioning systems in the building that serve three of the 17 rooms as follows:

System Mfg.	Type	Nominal Tonnage	Room Served	Wattage in Room	Age of System	Calculated Coolingload, Tons
Typhoon	Air-Cooled	10	#10	31,400	13 yrs.	11.2
Carrier	Water-Cooled	15	#11	31,700	3 yrs.	9.8
Chrysler	Air-Cooled	10	#12a	25,500	9 yrs.	8.8

The remainder of the 17 rooms are not air conditioned. The total calculated cooling load for these non-air-conditioned rooms (excluding Rooms 12b, 14a, and 14b which are not desired

to be air conditioned) is 7.6 tons. All the calculated cooling loads stated herein are based on the room temperatures desired (68°-70° in Room 11 and 70°-75° in all other rooms), a room relative humidity of 55% in all conditioned rooms, and with outside air introduced into the rooms for ventilation. These loads do not include the 20% air conditioning reserve requested by the users.

The three existing air conditioning systems are troublesome in various ways. The Typhoon system which is the oldest, is obviously in need of a complete overhaul and probable replacement of many component parts. The Carrier system, which is water-cooled, should be winterized to prevent freeze-up of the condenser water during winter operation. The Chrysler system needs an outside air intake to provide ventilation air. All three systems should be serviced in the manner stated in our previous letter to you dated February 12, 1969, even if it is intended to keep these units in operation for only a short time.

CHOICES OF ACTION

The users have stated the following as the special features they desire in the redesign of their air-conditioning systems.

1. Air-cooled condensers.
2. Automatic humidity control.
3. Return air duct from each area.
4. Outside air intake for ventilation.
5. 20% reserve cooling capacity.
6. A.C. equipment to be roof-mounted.
7. Dual independent systems capable of backing each other up in Rooms 11 and 12A.

These features can be obtained in various ways, to varying degrees of satisfactions of the users. It would appear desirable that any new equipment installed be of the factory-packaged type that can be shipped pre-assembled and pre-charged to the site and require the minimum amount of field connections to put it into operation.

The following is a listing of practical alternate courses of action with the advantages, disadvantages, and approximate costs of each scheme:

1. New overall installation: - Retain and rehabilitate the three existing air-conditioning systems, and add a new

air-cooled self-contained factory-assembled multi-zone unit with humidifier located on the roof or on a concrete pad alongside the building. Separate thermostatically-controlled zones from the unit would be connected to each of the existing duct runs and to new ductwork serving the presently non-air-conditioned rooms. The rehabilitated air conditioning units would serve as back-up to the new unit. If no back-up is required for Room 10, the Typhoon system could be discarded. This system would fulfill all 7 of the requirements of the users and would result in a high degree of comfort for them.

Approximate Construction Cost....$50,000.00

2. Replace Typhoon Unit:-This would entail the following:

a. Remove existing Typhoon unit serving Room 10. This unit is approximately 13 years old and is giving the most trouble.

b. Install a new nominal 15-ton self-contained air-cooled factory-packaged single-zone unit and connect it to the ductwork serving Room 11 and 12A so that it can be used as a back-up for these rooms. At such times Room 10 would be without air conditioning. This new unit

could be located on the roof or in the space now occupied by the Typhoon unit.

c. Install a new nominal 10-ton self-contained air-cooled factory-packaged single-zone unit for the presently non-air-conditioned rooms and provide new air supply and return ductwork to those rooms. This unit could be located on the roof or on a concrete slab slab alongside the building.

d. Add 4 humidifiers and controls, one for each of the two remaining existing systems and one for each of the new systems.

e. Winterize the Carrier systems cooling tower and condenser water piping.

f. Rehabilitate the two remaining existing air conditioning units and provide return air and outside air for each unit.

Approximate Construction Cost....$25,000.00.

The resultant installation would fail to meet the users stated requirements in two respects, namely; 1) one unit would not be air-cooled, and 2) all the units would not be roof-mounted. Winterization of the Carrier system

cooling tower would prevent freezing of the tower water in cold weather which should make the system availability equal to an air-cooled installation regardless of the weather.

3. Rehabilitate the existing systems and add to them:- This would entail the following:

a. Add a new nominal 10-ton air-cooled self-contained factory-packaged single-zone air conditioning unit for the presently non-air conditioned spaces and connect to new ductwork serving those spaces. This new unit could be located on the roof or on a concrete pad alongside the building.

b. Add 4 humidifiers and controls, one for each of the 3 existing systems and one for the new system.

c. Winterize the Carrier system's cooling tower and condenser water piping.

d. Rehabilitate the 3 existing air conditioner units and provide return air and outside air for each unit.

Approximate construction cost..$15,000.00.

The resultant installation would fail to meet the users stated requirements in three respects, namely; 1) one of the condensers would not be air-cooled, 2) there would not be 20% reserve cooling capacity, 3) all the units would not be roof-mounted, and 4) there would be no back-up for Rooms 11 and 12A. In addition the user would have to keep the 13-year old Typhoon unit in service or lose cooling for Room 10 with its electrical load of 31,400 watts. Since the normal expected life of this type of unit is approximately 10 years, it can be anticipated that extensive repairs will be required to keep this unit in operation.

4. Rehabilitate the three existing systems:-This would entail the following:

a. Add 3 humidifiers and controls, one for each of the 3 existing systems.

b. Winterize the Carrier system's cooling tower and condenser water piping.

c. Rehabilitate the 3 existing air conditioning units and provide return air and outside air for each unit.

Approximate Construction Cost..$2,500.00.

The resultant installation would fail to meet the users stated requirements except that humidity control, return air, and outside air would be provided only for Rooms 10, 11, and 12A. The same problems previously stated in regard to use of the Typhoon unit would still be present.

The decision as to which of these four alternate schemes should be adopted depends on the projected life of the installation, the degree of reliability actually required, the effect on the installed equipment and personnel of a lack of air conditioning, and similar considerations. In any case, regardless of the scheme chosen, the equipment that is installed should be maintained on a regularly scheduled basis in order to gain uninterrupted optimum performance.

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ATTACHMENT #2

ROOM #1 — 14'8" x 12'0" x 10'6"
1,850 Cu. Ft.
200 W.
1 Person

ROOM #2 — 14'0" x 13'8½" x 10'6"
2,010 Cu. Ft.
200 W.
2 Persons

ROOM #3 — 13'0" x 11'0" x 10'6"
1,500 Cu. Ft.
200 W.
1 Person

ROOM #4 — 13'0" x 9'0" x 10'6"
1,228 Cu. Ft.
220 W.

ROOM #5A — 11'6" x 3'7½" x 10'6"
434 Cu. Ft.
300 W.

ROOM #5B — 11'6" x 3'7½" x 10'6"
434 Cu. Ft.
300 W.

ROOM #5C — 19'6" x 6'0" x 10'6"
1,228 Cu. Ft.
250 W.

ROOM #6A — 31'0" x 13'10" x 10'6"
4,492 Cu. Ft.
1,000 W
3 Persons

ROOM #7 — 31'0" x 20'0" x 10'6"
5,313 Cu. Ft.
4,000 W.
5 Persons

ROOM #8 — 12'0" x 7'6" x 10'6"
945 Cu. Ft.
200 W.
1 Person

ROOM #9 — 18'4" x 14'0" x 10'6"
2,720 Cu. Ft.
1,2 KW (lighting)
0 Persons

ROOM #10 — 50' x 29'10" x 10'0"
14,500 Cu. Ft.
31.4 KW
8 Persons

ROOM #11 — (L-Shaped, w/10'6" ceiling Ceiling H. ??)
4568 Cu. Ft.
31.7 KW
0 Persons

ROOM #12A — (Irreg. Shaped, w/10'6" Ceiling Height)
9,600 Cu. Ft.
25.5 KW

ROOM #13 A,B,C, — (Hallway, Toilet, Kitchen)
1,533 Cu. Ft.
3 KW

Attachment #3

Systems Installed:

1. The Carrier system, installed approximately 3 years ago, consists of two each Model 50K8-A929, 7.5 Ton, 208/230 VAC, 60 Hz units (Ser. Nos. 5408741, 5408743), with roof-mounted water-cooled condenser units. The return air intake opening (15" x 41") on the front side of cabinets for these units has been closed and an opening has been made in the rear of each unit to accommodate an 11" x 42" duct which is set in the wall immediately behind each unit.

2. The Chrysler system, installed approximately 9 years ago, consists of two each Model 3705-00R, 5 Ton, 208/230 VAC, 60 Hz units with air-cooled condensers. (Serial numbers unknown.) The return air intake opening (22" x 45") on the front of these units also has been closed and an opening has been made in the rear of each unit to accommodate a duct, 11.5" x 45", set in the wall immediately behind each unit.

3. The Typhoon system, a dual 5 Ton type, consists of an evaporator unit, Typhoon Model 10LSU, 230 VAC, 60 Hz, (Ser. No. 136), and an air-cooled dual condensing unit, Typhoon 10ACCU, 230 VAC, 60 Hz, (Serial Number unknown). This system was installed approximately 13 years ago.

Comments on operation.

1. The Carrier system has water cooled condensers and has on several occasions frozen, damaging pumps and/or bursting pipes. We have attempted to correct this by the use of antifreeze. Since replenishment is not automatic, this procedure sometimes fails.

2. The Chrysler system has air cooled condensers and has given the least trouble over the past two years (although we have replaced one compressor motor). The ducting for this system (a non-professional installation) should receive close scrutiny. Further, this system does not properly exhaust and replace stale air.

3. The Typhoon is by far the least effective system. Neither half operates satisfactorily at this time because of age and, we suspect, undetected leaks in the evaporator.

4. All systems have suffered from the lack of professionally trained maintenance personnel.

Attachment #4

Factors for consideration:

1. Room temperatures desired -
   Room 11 - 68 to 72 degrees F. year around
   Rooms 10 and 12A - 70 to 75 degrees F. year around
   Remaining rooms - 70 to 75 degrees seasonally (7 to 8 months per year)

2. Equipment location -
   Compressors and condensers should be roof mounted

3. Back-up capability -
   Systems should be dual, normally operating independently but capable of being mixed and/or switched to the critical areas, rooms 11 and 12A.

4. Special Features desired -
   A. Condensers air cooled
   B. Automatic humidity control
   C. Duct return air from each area
   D. Adjustable fresh air intake
   E. Reserve cooling capacity of 20% minimum